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F. V. SHARLENE K Shrimp Survey 89-S-1, West Coast of Vancouver Island, May 10-16, 1989

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ABSTRACT

Boutillier, J. A., W. R. Harling and D. E. Young. 1990. F. V. SHARLENE K shrimp survey 89-S-1, west coast of Vancouver Island, May 10-16, 1989. Can. Data Rep. Fish. Aquat. Sci. 807: 38 p.

This report summarizes information obtained during a shrimp biomass survey of the Tofino grounds off the West Coast of Vancouver Island, conducted May 10-16, 1989. This is one of a continuing series of spring surveys done to determine biomass estimates, year-class abundance, and distribution of the pink shrimp, *Pandalus jordani*. This report provides detailed catch records and resulting biomass evaluations. The overall assessment shows about a 9% decline in shrimp biomass since the 1988 assessment. This reduction in biomass is mainly due to declines in abundance of the 3-year-old animals.

RÉSUMÉ

Boutillier, J. A., W. R. Harling and D. E. Young. 1990. F. V. SHARLENE K shrimp survey 89-S-1, west coast of Vancouver Island, May 10-16, 1989. Can. Data Rep. Fish. Aquat. Sci. 807: 38 p.

Le présent rapport présente les données recueillies au cours d'une campagne d'échantillonnage effectuée du 10 au 16 mai 1989 visant à établir la biomasse de crevettes dans le secteur de Tofino au large de la côte ouest de l'île Vancouver. Cette campagne s'inscrit dans une série de campagnes printanières visant à déterminer la biomasse, l'abondance des classes d'âge et la distribution de la crevette *Pandalus jordani*. Les registres détaillés des prises et les évaluations de la biomasse obtenues à partir de ces registres sont présentés. Globalement, les résultats montrent une diminution de la biomasse de 9 % par rapport à l'évaluation de 1988. Cette réduction s'explique principalement par une diminution de l'abondance des crevettes de trois ans.

INTRODUCTION

A shrimp biomass survey of the Tofino grounds, fisheries statistical area (FSA) 124 was conducted May 10-16, 1989 aboard the F.V. Sharlene K (Fig. 1). The fishery in this area targets exclusively on smooth pink shrimp and surveys of this stock have been conducted on these grounds 14 times in spring (April-May) and three times in the late summer (August-September). The purpose of these cruises is to provide relative estimates of total biomass, year-class abundance, and distribution of the smooth pink shrimp, Pandalus jordani.

SURVEY DESIGN AND FISHING GEAR

This biomass trawl survey was carried out using a standard 18.6 m, National Marine Fisheries Service (NMFS), high-rising, shrimp-sampling trawl (Boutillier et al. 1977). Trawl locations for the biomass survey were established using a systematic grid pattern based on Loran C blocks. Tows were made diagonally through adjacent 5900-Z 10-microsecond blocks along successive 5900-Y lines, 20 microseconds apart. Tow duration, except when tows were fouled, was 30 minutes and the distance covered, depending on tide and wind, ranged from 1.1 to 1.7 nautical miles (M) with an average distance of 1.39 M. From each trawl catch dumped on deck, large species were sorted, weighed and discarded. A small, random, bucket sample of shrimp was collected and processed to determine the number of shrimp/kilogram (No./kg). The 1 kg sample was then sorted by sex, and the carapace length measured (orbit of the eye to mid-dorsal, posterior margin of the carapace). The balance of each catch, consisting of shrimp, small fish, and invertebrates, was shovelled into baskets and weighed. One or two tubs of this mixed catch were then sorted by species and each species was weighed individually to determine the proportional catch composition. The calculated percentage of species by weight was then used to extrapolate the total shrimp and other species weight in the catch.

The biomass and year-class abundance indices were calculated using a bicubic spline. For this analysis the Tofino ground is defined as the rectangular area that starts at $126^{0}05'$ longitude and $48^{0}35'$ N latitude and runs 50 M at 322^{0} True (T) and 15 M at 52^{0} T. This area is divided into 2 sq M cells which are 1 M wide and 2 M long. The towable area within this large area is identified by a set of untowable boundary points which were determined from all the surveys. The calculation of biomass assumes that all the towable area is potential shrimp grounds. This analysis sets the density [(kg or #)/0.2 sq M towed] obtained in the tow or in the case of repeated tows the mean of the two tows, equivalent to the density at the grid point which corresponds to the centre point of the tow. The area is divided into smaller 0.2 sq M cells and a bicubic spline is used to fill blank grid cells with interpolated values. The biomass and areas of concentration are then calculated by adding the values greater than some minimal density and counting the grid cells and multiplying by 0.2.

RESULTS

The Tofino shrimp ground lies offshore from the west coast of Vancouver Island between 48°40′ and 49°15′ north latitude. A total of 67 trawl tows were completed on this ground. Tow locations are shown in Figure 2. Catch, by species, is summarized in descending order of abundance in Table 1. Detailed fishing logs and catch records are presented in Appendix Table 1.

This area-swept biomass survey found that shrimp were in concentrations >1 tonne/sq M in a 171 sq M area. Of the 67 usable tows, 46 contained shrimp varying in amounts from trace to 958 kg per nautical mile towed (kg/M), with a mean catch rate of 111 kg/M (Table 2). A weighted estimate of the age-class structure of the shrimp determined that the samples were composed of 5.5% 1-year-old, 59.2% 2-year-old, and 35.3% 3-year-old animals. Mean carapace size for these three age groups were 12.8, 17.4, and 21.1 mm, respectively. The number of shrimp per kilogram ranged from 168 to 326 (Appendix Table I) while the size and density of shrimp for each tow combined to give an overall weighted mean of 243.

The relative abundance of biomass and the three year classes of shrimp, for all spring surveys (plus the August 1987 survey) is shown in Figure 3.

DISCUSSION

In comparison with the 1988 assessment, the 1989 overall assessment of shrimp shows about a 9% decline in shrimp on the grounds. The major difference between the two assessments was a shift in the proportions of 2+ and 3+ animals (Fig. 3). The combined totals of 2+ and 3+ animals (the major year classes targeted on in the fishery) for the 1988 and 1989 surveys was 9.5 x 10^8 and 8.6 x 10^8 animals respectively. Between 1988 and 1989, however, the 2+ index has shown almost a 47% increase with indices of 3.7 x 10^8 to 5.4 x 10^8 for 1988 and 1989 respectively. On the other hand the relatively weak 2+ year class in 1988 has resulted in a weak 3+ year class in 1989 which translated into a 45% decrease in indices from 5.8 x 10^8 to 3.2 x 10^8.

The prediction for 1990 suggests that the fishery on the 3+ animals will increase over the 1989 level but it will still be lower than the 1988 fishery. The index of 2+ animals in the 1987 survey was still 33.3% higher than the 1989 index. How strong the 2+ index of animals will be in 1990 depends on how strong the 1+ animals recruit. In the past the 1+ index obtained in a spring survey resulted in a 2+ index the following year which had increased by a factor varying from 2-20 times the 1+ index.

REFERENCES

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Harling, W. R. and D. E. Young. 1990. W. E. RICKER shrimp survey 88-S-1, West Coast Vancouver Island, April 28-May 8, 1988. Can. Data Rep. Fish. Aquat. Sci.

Table 1. Total catch, by species, for the west coast Vancouver Island shrimp biomass survey 89-S-1, May 10-16, 1989.

Species		Weight (kg)	% of catch
Pink shrimp	*Pandalus jordani*	7210	33.2
Herring	*Clupea harengus pallasi*	4218	19.4
Dogfish	*Squalus acanthias*	4150	19.1
Eulachon	*Thaleichthys pacificus*	1645	7.6
Yellowtail rockfish	*Sebastes flavidus*	1370	6.3
Pacific cod	*Gadus macrocephalus*	1015	4.7
Pacific dab	*Citharichthys sordidus*	457	2.1
Canary rockfish	*Sebastes pinniger*	446	2.1
Lingcod	*Ophiodon elongatus*	419	1.9
Turbot	*Atheresthes stomias*	237	1.1
Other[a]		529	2.5
Total weight		21696	100.0

[a]Those species, each of which contribute less than 1% to the total catch. Species comprising this group are listed in the footnotes to Appendix Table 1.

Table 2. *P. jordani* catch (kg) per nautical mile (M), 89-S-1, May 10-16, 1989.

Tow No.	Depth (metres)	Duration (min.)	M	Weight (kg)	No./kg	Kg/M
1	98-98	30	1.3	0	-	-
2	113-114	30	1.2	8	326	6.7
3	132-134	30	1.3	7	200	5.4
4	155-156	30	1.3	0	-	-
5	104-105	30	1.2	0	-	-
6	120-122	30	1.4	133	270	95.0
7	142-147	30	1.2	Tr	-	-
8	159-159	30	1.1	0	-	-
9	145-144	32	1.2	9	199	7.5
10	126-125	30	1.3	57	201	43.8
11	106-106	30	1.3	102	264	78.5
12	112-111	30	1.3	133	215	102.3
13	125-124	31	1.4	55	197	39.3
14	142-143	33	1.5	25	199	16.7
15	155-153	30	1.4	0	-	-
16	97-98	30	1.3	0	-	-
17	115-115	30	1.2	136	218	113.3
18	106-104	30	1.3	Tr	-	-
19	123-126	30	1.3	121	215	93.1
20	134-132	30	1.3	20	207	15.4
21	153-156	30	1.4	7	175	5.0
22	151-150	30	1.5	19	238	12.7
23	155-156	31	1.3	3	208	2.3
24	138-137	30	1.3	83	230	63.8
25	128-124	30	1.4	117	212	83.6
26	112-110	30	1.4	320	214	228.6
27	90-90	30	1.5	0	-	-
28	100-100	30	1.3	0	-	-
29	113-113	30	1.3	106	175	81.5
30	122-119	30	1.4	439	190	313.6
31	134-133	30	1.4	76	191	54.3
32	144-145	30	1.4	17	212	12.1
33	145-143	30	1.5	52	255	34.7
34	137-136	30	1.4	399	294	285.0
35	127-125	30	1.4	195	240	139.3
36	111-110	29	1.4	73	178	52.1
37	98-98	30	1.6	0	-	-
38	101-103	33	1.4	0	-	-
39	117-115	31	1.5	0	-	-
40	130-130	30	1.3	116	272	89.2
41	138-139	32	1.5	145	225	96.7
42	151-145	30	1.4	8	242	5.7
43	141-135	30	1.4	40	269	28.6
44	124-123	30	1.6	519	269	324.4

Table 2. (cont'd).

Tow No.	Depth (metres)	Duration	M	Weight (kg)	No./kg	Kg/M
45	116-119	32	1.7	3	240	1.8
46	108-106	30	1.5	0	-	-
47	106-106	30	1.6	0	-	-
48	115-116	30	1.5	Tr	-	-
49	122-122	30	1.4	166	234	118.6
50	129-126	32	1.6	621	237	388.1
51	137-136	31	1.7	0	-	-
52	132-133	30	1.4	109	243	77.9
53	138-141	30	1.5	139	236	92.7
54	128-126	30	1.4	451	299	322.1
55	131-129	30	1.4	32	168	22.9
56	125-125	29	1.3	5	212	3.8
57	119-116	35	1.6	41	225	25.6
58	107-104	30	1.4	260	263	185.7
59	95-90	30	1.5	0	-	-
60	92-92	30	1.5	0	-	-
61	108-112	31	1.3	1176	242	904.6
62	121-121	30	1.3	0	-	-
63	119-121	33	1.4	0	-	-
64	114-110	30	1.3	0	-	-
65	102-103	30	1.5	0	-	-
66	110-111	30	1.4	667	278	476.4
67	100-98	30	1.3	0	-	-

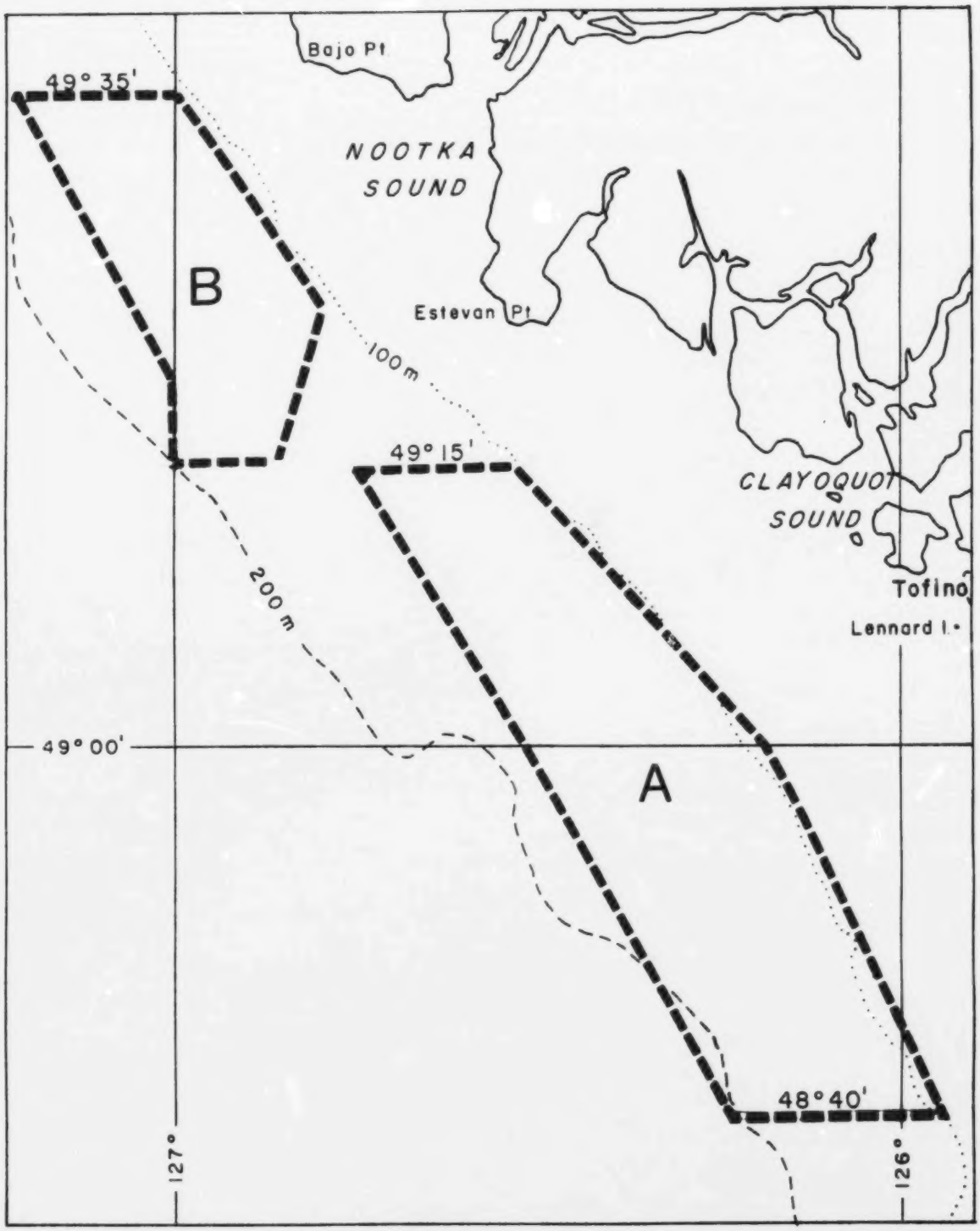

Fig. 1. General location of the Tofino (A) and Nootka (B) shrimp (*P. jordani*) fishing grounds off west coast Vancouver Island.

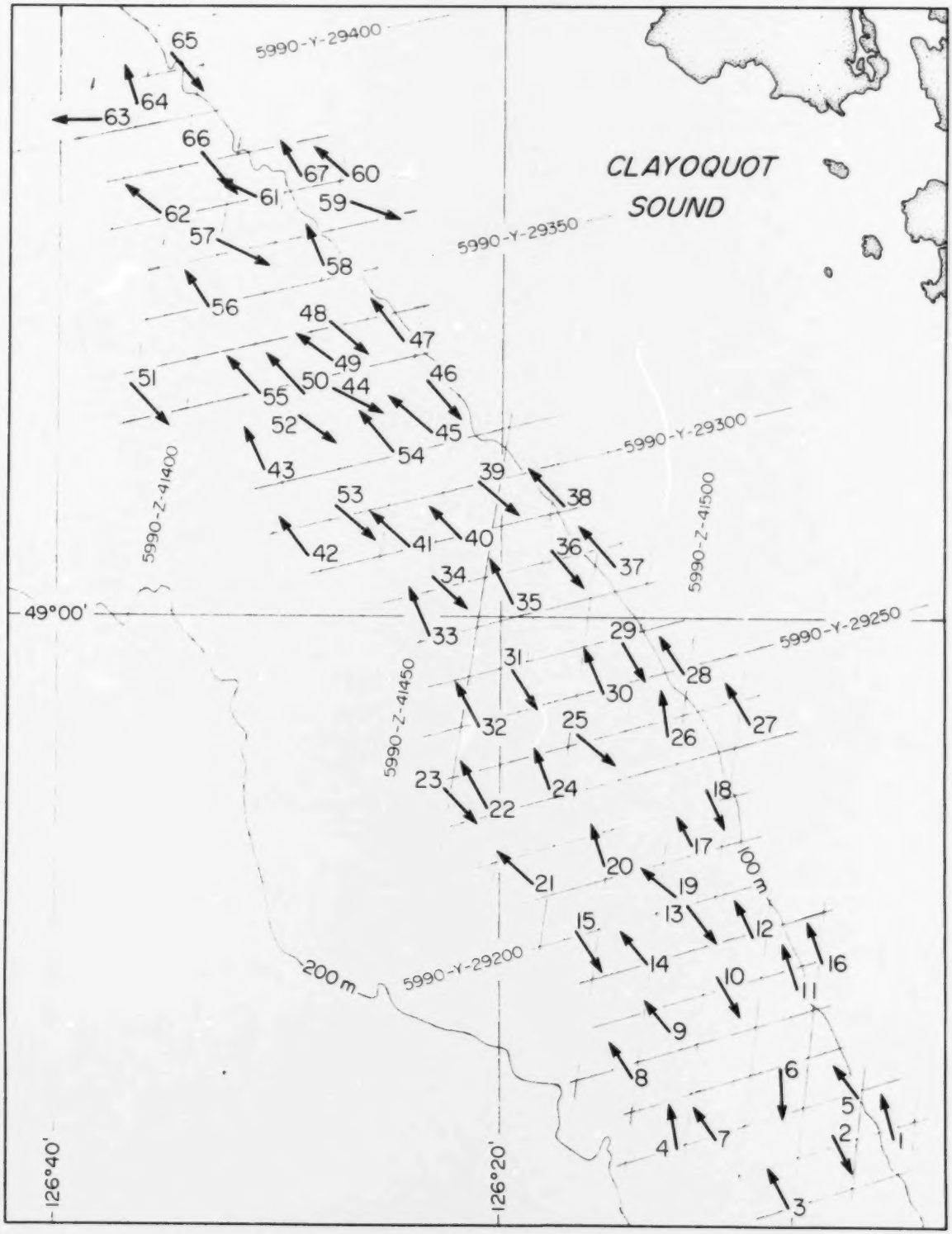

Fig. 2. Location of tows completed by M.V. SHARLENE K during shrimp cruise 89-S-1 off west coast Vancouver Island, May 10-16, 1989.

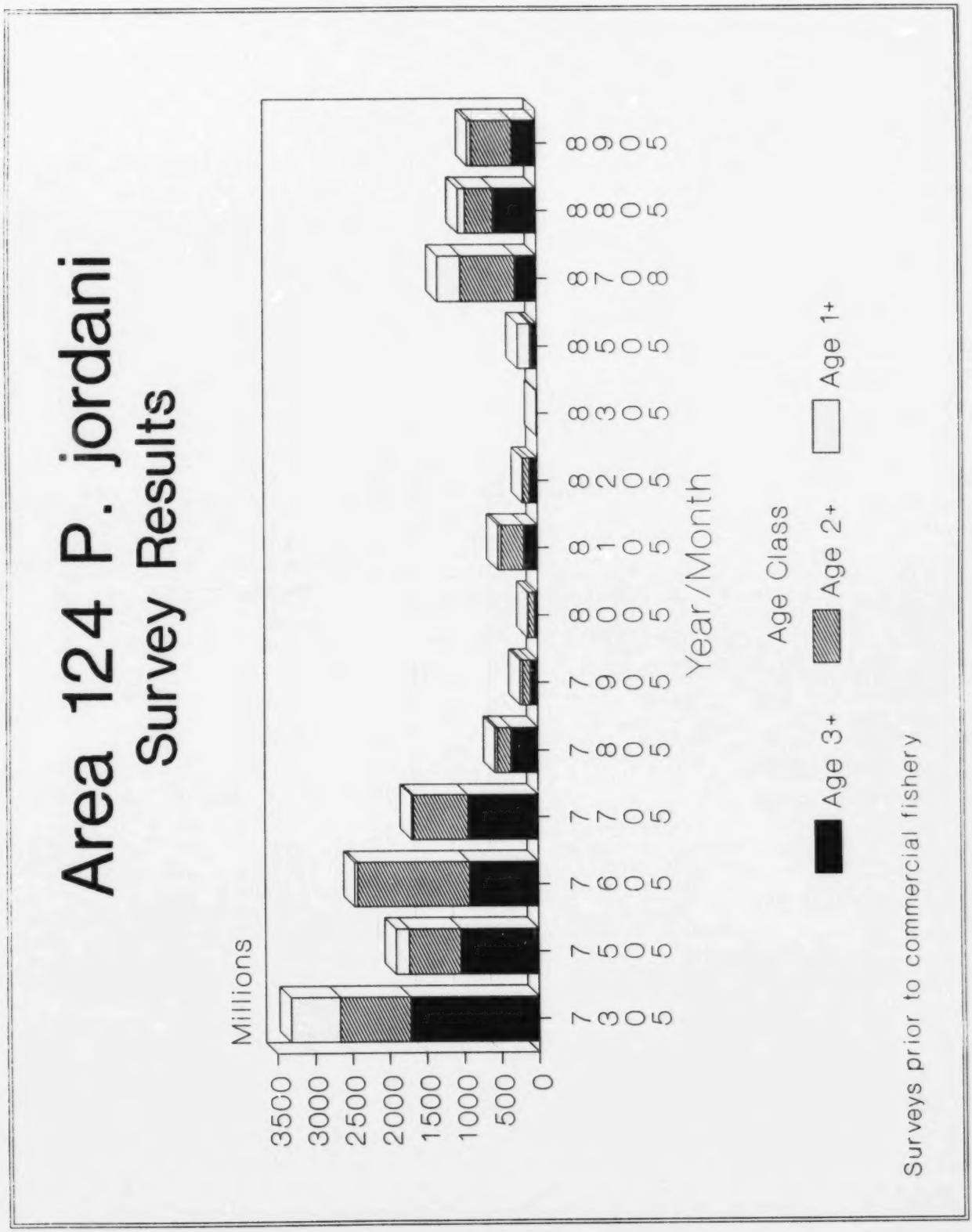

Fig. 3. Relative abundance of shrimp (*P. jordani*) year classes on Tofino Ground.

APPENDIX TABLE 1

APPENDIX TABLE 1. FISHING LOG AND CATCH TOTALS OF F.V SHARLENE K SHRIMP SURVEY 89-S-1, (MAY 10-16, 1989) OFF THE WEST COAST OF VANCOUVER ISLAND (SEE FOOTNOTE AT END OF TABLE FOR EXPLANATION OF TERMS).

HAUL NO.	1	2	3	4	5	6
DATE	MAY 10	MAY 10	MAY 10	MAY 10	MAY 11	MAY 11
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	1438	1548	1655	1805	0717	0822
DURATION(HR.MIN)	.30	.30	.30	.30	.30	.30
START N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	44.6	44.7	42.5	44.2	45.8	46.7
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	02.2	05.1	07.1	12.0	03.7	07.4
DIRECTION (DEG.TRUE)	332	172	322	322	332	152
FINISH N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	45.9	43.6	43.6	45.4	46.7	45.3
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	02.8	04.2	07.9	12.3	04.9	07.3
DISTANCE NAUT. MI.	1.3	1.2	1.3	1.3	1.2	1.4
DEPTH (METERS)	98- 98	113-114	132-134	155-156	104-105	120-122
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	348	1107	111	39	370	227
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. (CONTINUED

HAUL NO.	1	2	3	4	5	6
DATE	MAY 10	MAY 10	MAY 10	MAY 10	MAY 11	MAY 11
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	348	1107	111	39	370	227
SHRIMP						
PINK (JORDANI)	..	8	7	..	..	133
NUM/KG	..	326	200	..	..	270
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	..	..	..	..	T	..
FLATFISH						
DAB (PACIFIC)	54	..	..	..	44	..
TURBOT	..	..	2	23	..	..
OTHERS	7	4	6	4	1	..
ROCKFISH						
S. FLAVIDUS	..	23	27	1	..	..
S. PINNIGER	..	..	3	..	..	3
OTHERS	..	..	..	4	..	..
OTHER ROUNDFISH						
EULACHON	..	10	15	4	10	52
HERRING	T	7	2	..	T	6
LINGCOD	..	..	..	..	..	5
PACIFIC COD	..	4	20	..	..	6
OTHERS	T	..	..	..	..	1
SELACHI						
DOGFISH	287	1051	28	1	315	19
SKATES	..	..	1	2	T	..
OTHERS	..	..	T	..	..	2

APPENDIX TABLE 1. CONTINUED

HAUL NO.	7	8	9	10	11	12
DATE	MAY 11	MAY 11	MAY 11	MAY 11	MAY 11	MAY 11
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	0925	1026	1129	1232	1331	1425
DURATION(HR.MIN)	.30	.30	.32	.30	.30	.30
START N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	44.6	46.3	47.7	49.4	49.0	50.5
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	10.3	13.9	12.3	10.1	06.6	08.6
DIRECTION (DEG.TRUE)	322	332	342	142	332	332
FINISH N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	45.5	47.4	48.8	48.4	50.1	51.7
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	11.2	14.8	13.3	09.3	07.4	09.5
DISTANCE NAUT. MI.	1.2	1.1	1.2	1.3	1.3	1.3
DEPTH (METERS)	142-147	159-159	145-144	126-125	106-106	112-111
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	68	4	427	477	344	446
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1 CONTINUED

HAUL NO.	7	8	9	10	11	12
DATE	MAY 11	MAY 11	MAY 11	MAY 11	MAY 11	MAY 11
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	68	4	427	477	344	446
SHRIMP						
PINK (JORDANI)	T	..	9	57	102	133
NUM/KG	..	..	199	201	264	215
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	..	..	..	..	..	..
FLATFISH						
DAB (PACIFIC)	..	..	..	..	33	26
TURBOT	27	..	2	..	..	..
OTHERS	4	..	4	3	12	..
ROCKFISH						
S. FLAVIDUS	..	..	9	..	..	3
S. PINNIGER	..	..	..	..	..	..
OTHERS	2	..	..	1	..	..
OTHER ROUNDFISH						
EULACHON	8	2	56	44	18	31
HERRING	T	2	121	47	13	22
LINGCOD	..	..	..	2	..	..
PACIFIC COD	8	..	12	9	..	1
OTHERS	3	..	..	..	1	7
SELACHI						
DOGFISH	7	..	214	309	164	222
SKATES	9	..	..	4	1	1
OTHERS	..	..	T	1	..	..

APPENDIX TABLE 1 CONTINUED

HAUL NO.	13	14	15	16	17	18
DATE	MAY 11	MAY 11	MAY 11	MAY 12	MAY 12	MAY 12
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	1528	1635	1740	0715	0830	0932
DURATION(HR.MIN)	.31	.33	.30	.30	.30	.30
START N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	51.4	49.8	50.7	49.8	53.2	54.9
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	11.7	13.3	16.6	05.5	11.4	10.8
DIRECTION (DEG.TRUE)	162	312	152	337	322	162
FINISH N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	50.4	50.9	49.6	51.0	54.3	53.8
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	10.3	14.7	15.5	06.4	12.2	09.9
DISTANCE NAUT. MI.	1.4	1.5	1.4	1.3	1.2	1.3
DEPTH (METERS)	125-124	142-143	155-153	97- 98	115-115	106-104
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	262	279	97	150	301	114
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	13	14	15	16	17	18
DATE	MAY 11	MAY 11	MAY 11	MAY 12	MAY 12	MAY 12
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	262	279	97	150	301	114
SHRIMP						
PINK (JORDANI)	55	25	..	..	136	T
NUM/KG	197	199	..	..	218	..
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	..	..	..	..	T	..
FLATFISH						
DAB (PACIFIC)	..	1	..	63	11	7
TURBOT	..	49	34	..	..	..
OTHERS	..	2	5	2	..	1
ROCKFISH						
S. FLAVIDUS	4	7	4	..	17	7
S. PINNIGER	6	3	..	..	5	..
OTHERS	..	T	4	..	..	..
OTHER ROUNDFISH						
EULACHON	102	31	17	11	36	4
HERRING	75	3	T	8	84	88
LINGCOD	..	9	..	6	..	..
PACIFIC COD	..	28	18	..	..	..
OTHERS	4	1	5	T	2	T
SELACHI						
DOGFISH	16	111	1	24	10	..
SKATES	..	2	3	36	..	7
OTHERS	..	7	6	..	..	..

APPENDIX TABLE 1. CONTINUED

HAUL NO.	19	20	21	22	23	24
DATE	MAY 12	MAY 12	MAY 12	MAY 12	MAY 12	MAY 12
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	1041	1132	1243	1345	1447	1553
DURATION(HR.MIN)	.30	.30	.30	.30	.31	.30
START N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	51.8	52.7	52.1	54.4	54.9	54.9
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	12.0	15.1	18.5	20.6	22.5	17.8
DIRECTION (DEG.TRUE)	322	337	327	322	157	352
FINISH N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	52.6	53.9	53.0	55.6	53.9	56.2
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	13.5	15.9	20.0	21.7	21.2	18.5
DISTANCE NAUT. MI.	1.3	1.3	1.4	1.5	1.3	1.3
DEPTH (METERS)	123-126	134-132	153-156	151-150	155-156	138-137
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	266	244	138	121	55	125
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	19	20	21	22	23	24
DATE	MAY 12	MAY 12	MAY 12	MAY 12	MAY 12	MAY 12
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	266	244	138	121	55	125
SHRIMP						
PINK (JORDANI)	121	20	7	19	3	83
NUM/KG	215	207	175	238	208	230
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	..	..	..	..	..	T
FLATFISH						
DAB (PACIFIC)	..	..	..	..	..	..
TURBOT	..	T	32	2	5	..
OTHERS	1	..	6	1	T	2
ROCKFISH						
S. FLAVIDUS	15	..	4	1	..	1
S. PINNIGER	1	..	2	..	..	..
OTHERS	..	1	3	T	5	..
OTHER ROUNDFISH						
EULACHON	67	27	9	16	21	18
HERRING	46	47	2	2	1	4
LINGCOD	..	6	2	..	4	6
PACIFIC COD	..	..	7	..	1	..
OTHERS	1	..	10	1	2	T
SELACHI						
DOGFISH	12	143	49	79	13	11
SKATES	2	..	..	..	..	..
OTHERS	..	..	5	T	..	..

APPENDIX TABLE 1. CONTINUED

HAUL NO.	25	26	27	28	29	30
DATE	MAY 12	MAY 12	MAY 13	MAY 13	MAY 13	MAY 13
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	1648	1749	0635	0734	0831	0929
DURATION(HR.MIN)	.30	.30	.30	.30	.30	.30
START N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	56.6	56.5	56.9	58.4	59.3	57.8
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	16.5	12.4	08.8	11.7	14.6	15.4
DIRECTION (DEG.TRUE)	147	327	332	322	157	327
FINISH N. LAT. (DEG)	048	048	048	048	048	048
(MIN)	55.7	57.9	58.2	59.5	58.2	59.1
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	14.9	12.8	09.8	12.9	13.5	16.2
DISTANCE NAUT. MI.	1.4	1.4	1.5	1.3	1.3	1.4
DEPTH (METERS)	128-124	112-110	90- 90	100-100	113-113	122-119
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	164	382	27	196	229	548
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	25	26	27	28	29	30
DATE	MAY 12	MAY 12	MAY 13	MAY 13	MAY 13	MAY 13
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	164	382	27	196	229	548
SHRIMP						
PINK (JORDANI)	117	320	..	..	106	439
NUM/KG	212	214	..	..	175	190
OTHER SHRIMP	T	..	..	..	..	..
INVERTEBRATES						
OTHERS	..	..	T	..	..	..
FLATFISH						
DAB (PACIFIC)	..	22	7	5	14	..
TURBOT	1	1	2	4	..	..
OTHERS	1	6	T	1	4	T
ROCKFISH						
S. FLAVIDUS	..	1	..	74	3	1
S. PINNIGER	..	..	..	7	..	..
OTHERS	1	4	..	..	..	..
OTHER ROUNDFISH						
EULACHON	35	13	5	3	53	86
HERRING	1	11	10	50	35	21
LINGCOD	..	..	..	..	..	..
PACIFIC COD	..	3	..	49	..	..
OTHERS	T	1	3	3	2	..
SELACHI						
DOGFISH	5	..	..	..	12	1
SKATES	3	..	..	..	..	..
OTHERS	..	..	..	..	..	..

APPENDIX TABLE 1. CONTINUED

HAUL NO.	31	32	33	34	35	36
DATE	MAY 13	MAY 13	MAY 13	MAY 13	MAY 13	MAY 13
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	1035	1136	1230	1333	1428	1527
DURATION(HR.MIN)	.30	.30	.30	.30	.30	.29
START N. LAT. (DEG)	048	048	048	049	049	049
(MIN)	58.5	56.8	59.5	01.2	00.4	02.0
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	19.6	21.0	23.2	23.1	19.5	17.8
DIRECTION (DEG.TRUE)	152	327	332	147	342	157
FINISH N. LAT. (DEG)	048	048	049	049	049	049
(MIN)	57.4	58.0	00.8	00.3	01.7	01.0
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	18.4	22.0	24.1	21.6	20.4	16.5
DISTANCE NAUT. MI.	1.4	1.4	1.5	1.4	1.4	1.4
DEPTH (METERS)	134-133	144-145	145-143	137-136	127-125	111-110
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	158	181	252	777	341	354
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	31	32	33	34	35	36
DATE	MAY 13	MAY 13	MAY 13	MAY 13	MAY 13	MAY 13
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	158	181	252	777	341	354
SHRIMP						
PINK (JORDANI)	76	17	52	399	195	73
NUM/KG	191	212	255	294	240	178
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	..	1	..	..	T	..
FLATFISH						
DAB (PACIFIC)	..	..	..	..	..	1
TURBOT	..	1	7	T	3	..
OTHERS	2	T	5	..	2	4
ROCKFISH						
S. FLAVIDUS	..	1	..	1	33	13
S. PINNIGER	..	..	..	..	..	..
OTHERS	T	1	..	..	T	..
OTHER ROUNDFISH						
EULACHON	51	63	30	22	21	8
HERRING	29	79	100	264	70	195
LINGCOD	..	6	18	5	3	3
PACIFIC COD	..	3	..	..	..	3
OTHERS	..	..	..	T	..	5
SELACHI						
DOGFISH	..	9	32	84	14	49
SKATES	..	..	8	2	..	..
OTHERS	..	..	..	..	..	..

APPENDIX TABLE 1. CONTINUED

HAUL NO.	37	38	39	40	41	42
DATE	MAY 13	MAY 14	MAY 14	MAY 14	MAY 14	MAY 14
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	1620	0650	0752	0852	0950	1105
DURATION(HR.MIN)	.30	.33	.31	.30	.32	.30
START N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	01.5	03.3	04.1	02.3	02.0	01.7
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	14.9	17.2	21.0	21.7	24.1	28.5
DIRECTION (DEG.TRUE)	312	317	142	322	302	312
FINISH N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	02.7	04.3	03.1	03.2	03.0	02.9
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	16.5	18.8	19.4	23.1	25.8	29.9
DISTANCE NAUT. MI.	1.6	1.4	1.5	1.3	1.5	1.4
DEPTH (METERS)	98- 98	101-103	117-115	130-130	138-139	151-145
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	86	83	1180	267	1517	82
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	37	38	39	40	41	42
DATE	MAY 13	MAY 14	MAY 14	MAY 14	MAY 14	MAY 14
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	86	83	1180	267	1517	82
SHRIMP						
PINK (JORDANI)	..	..	..	116	145	8
NUM/KG	..	..	..	272	225	242
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	T	T	..	..	..	..
FLATFISH						
DAB (PACIFIC)	12	4	..	..	..	..
TURBOT	..	T	..	3	2	T
OTHERS	1	1	..	T	..	1
ROCKFISH						
S. FLAVIDUS	4	..	1100*	14	..	..
S. PINNIGER	..	..	..	..	4	..
OTHERS	..	..	..	1	..	..
OTHER ROUNDFISH						
EULACHON	23	6	40*	40	34	35
HERRING	10	31	30*	61	1200	14
LINGCOD	4	7	10*	14	33	20
PACIFIC COD	19	..	..	..	..	..
OTHERS	8	11	..	..	..	..
SELACHI						
DOGFISH	5	23	..	18	99	4
SKATES	..	T	..	..	..	..
OTHERS	..	..	..	..	..	..

APPENDIX TABLE 1. CONTINUED

HAUL NO.	43	44	45	46	47	48
DATE	MAY 14	MAY 14	MAY 14	MAY 14	MAY 14	MAY 14
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	1203	1315	1417	1515	1625	1720
DURATION(HR.MIN)	.30	.30	.32	.30	.30	.30
START N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	04.3	06.8	05.5	07.0	08.2	08.8
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	30.6	27.6	23.2	23.4	24.4	27.7
DIRECTION (DEG.TRUE)	312	132	317	132	317	147
FINISH N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	05.6	06.0	06.5	05.9	09.4	07.8
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	31.5	25.3	25.1	21.9	25.9	26.1
DISTANCE NAUT. MI.	1.4	1.6	1.7	1.5	1.6	1.5
DEPTH (METERS)	141-135	124-123	116-119	108-106	106-106	115-116
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	100	1280	537	38	39	68
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	43	44	45	46	47	48
DATE	MAY 14	MAY 14	MAY 14	MAY 14	MAY 14	MAY 14
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	100	1280	537	38	39	68
SHRIMP						
PINK (JORDANI)	40	519	3	..	..	T
NUM/KG	269	269	240	..	..	..
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	1	..	..	T	T	T
FLATFISH						
DAB (PACIFIC)	..	1	4	11	6	4
TURBOT	1	..	1	T	1	T
OTHERS	T	1	2	3	..	T
ROCKFISH						
S. FLAVIDUS	..	..	..	..	..	..
S. PINNIGER	..	..	..	..	..	..
OTHERS	..	..	3	..	..	..
OTHER ROUNDFISH						
EULACHON	27	74	57	1	11	9
HERRING	14	550	59	14	..	42
LINGCOD	9	7	21	5	6	10
PACIFIC COD	..	..	120	..	..	..
OTHERS	..	..	6	2	10	..
SELACHI						
DOGFISH	8	128	261	2	5	3
SKATES	..	..	..	..	..	..
OTHERS	..	..	..	..	..	..

APPENDIX TABLE 1. CONTINUED

HAUL NO.	49	50	51	52	53	54
DATE	MAY 14	MAY 15	MAY 15	MAY 15	MAY 15	MAY 15
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	1815	0715	0844	0955	1055	1200
DURATION(HR.MIN)	.30	.32	.31	.30	.30	.30
START N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	07.6	06.6	06.9	05.9	03.3	04.9
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	27.5	28.9	36.8	29.1	27.4	24.9
DIRECTION (DEG.TRUE)	312	322	132	132	132	312
FINISH N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	08.4	07.7	05.7	05.1	02.3	06.1
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	29.2	30.5	35.0	27.3	25.7	26.3
DISTANCE NAUT. MI.	1.4	1.6	1.7	1.4	1.5	1.4
DEPTH (METERS)	122-122	129-126	137-136	132-133	138-141	128-126
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	199	701	52	236	363	703
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	49	50	51	52	53	54
DATE	MAY 14	MAY 15	MAY 15	MAY 15	MAY 15	MAY 15
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	199	701	52	236	363	703
SHRIMP						
PINK (JORDANI)	166	621	..	109	139	451
NUM/KG	234	237	..	243	236	299
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	..		..	..	..	..
FLATFISH						
DAB (PACIFIC)	4	..	..	..	..	..
TURBOT	1	..	..	1	7	9
OTHERS	T	1	4	T	1	1
ROCKFISH						
S. FLAVIDUS	..	..	..	..	..	..
S. PINNIGER	..	..	2	..	..	..
OTHERS	..	..	4	..	..	..
OTHER ROUNDFISH						
EULACHON	19	68	..	19	42	66
HERRING	8	1	..	77	144	147
LINGCOD	1	5	39	13	14	9
PACIFIC COD	..	..	..	..	..	..
OTHERS	..	..	..	..	..	1
SELACHI						
DOGFISH	..	5	3	9	16	16
SKATES	..	..	..	8	..	3
OTHERS	..	..	T	..	..	..

APPENDIX TABLE 1. CONTINUED

HAUL NO.	55	56	57	58	59	60
DATE	MAY 15	MAY 15	MAY 15	MAY 15	MAY 15	MAY 15
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	1310	1403	1455	1600	1655	1753
DURATION(HR.MIN)	.30	.29	.35	.30	.30	.30
START N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	06.6	09.1	11.1	10.4	12.4	13.0
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	30.9	33.2	32.9	28.0	26.9	27.0
DIRECTION (DEG.TRUE)	312	312	132	312	132	302
FINISH N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	07.6	10.2	10.4	11.6	11.7	13.9
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	32.3	34.2	30.6	28.8	24.7	28.5
DISTANCE NAUT. MI.	1.4	1.3	1.6	1.4	1.5	1.5
DEPTH (METERS)	131-129	125-125	119-116	107-104	95- 90	92- 92
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	358	36	140	927	60	27
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	55	56	57	58	59	60
DATE	MAY 15	MAY 15	MAY 15	MAY 15	MAY 15	MAY 15
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	358	36	140	927	60	27
SHRIMP						
PINK (JORDANI)	32	5	41	260	..	..
NUM/KG	168	212	225	263	..	..
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	T	T	..	..	..	T
FLATFISH						
DAB (PACIFIC)	T	T	5	10	10	16
TURBOT	1	T	..	1	2	..
OTHERS	T	16	6	4	3	4
ROCKFISH						
S. FLAVIDUS	..	..	..	..	..	..
S. PINNIGER	314	..	..	..	..	..
OTHERS	..	..	..	..	..	..
OTHER ROUNDFISH						
EULACHON	5	7	2	28	..	T
HERRING	3	1	10	6	..	T
LINGCOD	1	..	5	9	25	4
PACIFIC COD	..	..	..	573	..	..
OTHERS	..	..	T	4	14	3
SELACHI						
DOGFISH	2	7	71	32	4	..
SKATES	..	..	..	..	2	..
OTHERS	..	..	..	..	..	..

APPENDIX TABLE 1. CONTINUED

HAUL NO.	61	62	63	64	65	66
DATE	MAY 16	MAY 16	MAY 16	MAY 16	MAY 16	MAY 16
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
TIME START (PST)	0722	0835	0955	1110	1209	1310
DURATION(HR.MIN)	.31	.30	.33	.30	.30	.30
START N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	12.3	11.9	14.6	15.0	16.7	13.7
W. LONG. (DEG)	126	126	126	126	126	126
(MIN)	31.2	35.4	38.2	36.5	35.0	33.6
DIRECTION (DEG.TRUE)	312	312	312	342	132	132
FINISH N. LAT. (DEG)	049	049	049	049	049	049
(MIN)	12.9	12.6	14.6	16.2	15.4	12.6
W.LONG. (DEG)	126	126	126	126	126	126
(MIN)	33.0	36.9	40.3	37.0	33.5	32.2
DISTANCE NAUT. MI.	1.3	1.3	1.4	1.3	1.5	1.4
DEPTH (METERS)	108-112	121-121	119-121	114-110	102-103	110-111
SEE FIGURE NO.						
SURFACE TEMP (DEG.C)	..	..	..	..	..	..
BOTTOM TEMP (DEG.C)	..	..	..	..	..	..
TYPE OF GEAR	8	8	8	8	8	8
TOTAL CATCH (KG)	1292	133	280	177	181	782
REMARKS	USABLE	USABLE	USABLE	USABLE	USABLE	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	61	62	63	64	65	66
DATE	MAY 16	MAY 16	MAY 16	MAY 16	MAY 16	MAY 16
AREA	CLSD	CLSD	CLSD	CLSD	CLSD	CLSD
CATCH TOTAL (KG)	1292	133	280	177	181	783
SHRIMP						
PINK (JORDANI)	1176	..	..	..	..	667
NUM/KG	242	..	..	..	..	278
OTHER SHRIMP	..	..	..	..	..	..
INVERTEBRATES						
OTHERS	..	..	..	..	..	..
FLATFISH						
DAB (PACIFIC)	21	1	3	15	14	16
TURBOT	1	..	1	..	1	7
OTHERS	18	1	1	5	2	9
ROCKFISH						
S. FLAVIDUS	2	..	..	..	..	..
S. PINNIGER	..	96	..	..	..	..
OTHERS	..	..	4	8	..	..
OTHER ROUNDFISH						
EULACHON	10	..	1	..	T	21
HERRING	17	6	176	38	105	9
LINGCOD	8	19	16	2	3	10
PACIFIC COD	24	..	..	94	2	10
OTHERS	14	..	11	3	3	27
SELACHI						
DOGFISH	1	10	67	12	39	6
SKATES	..	..	..	..	12	..
OTHERS	..	..	..	..	..	..

APPENDIX TABLE 1. CONTINUED

HAUL NO.	67
DATE	MAY 16
AREA	CLSD
TIME START (PST)	1413
DURATION(HR.MIN)	.30
START N. LAT. (DEG)	049
(MIN)	13.0
W. LONG. (DEG)	126
(MIN)	29.1
DIRECTION (DEG.TRUE)	342
FINISH N. LAT. (DEG)	049
(MIN)	14.1
W.LONG. (DEG)	126
(MIN)	30.0
DISTANCE NAUT. MI.	1.3
DEPTH (METERS)	100- 98
SEE FIGURE NO.	
SURFACE TEMP (DEG.C)	..
BOTTOM TEMP (DEG.C)	..
TYPE OF GEAR	8
TOTAL CATCH (KG)	42
REMARKS	USABLE

APPENDIX TABLE 1. CONTINUED

HAUL NO.	67
DATE	MAY 16
AREA	CLSD
CATCH TOTAL (KG)	42
SHRIMP	
PINK (JORDANI)	..
NUM/KG	..
OTHER SHRIMP	..
INVERTEBRATES	
OTHERS	1
FLATFISH	
DAB (PACIFIC)	12
TURBOT	2
OTHERS	6
ROCKFISH	
S. FLAVIDUS	..
S. PINNIGER	..
OTHERS	..
OTHER ROUNDFISH	
EULACHON	1
HERRING	..
LINGCOD	15
PACIFIC COD	1
OTHERS	2
SELACHI	
DOGFISH	2
SKATES	..
OTHERS	..

Footnotes to Appendix Table I

Area: CLSD = Clayoquot Sound (= Tofino Ground)
Time Start: PST = Pacific Standard Time
Type of Gear: 8 = Nat. Mar. Fish. Serv. 61-ft shrimp sampling trawl
Catch: T = Trace (<1 kilogram)
Others:

Invertebrates:	anemone; basket stars; brittle stars; cucumbers; prawn, squid (rossia and loligo); urchins.
Flatfish:	Butter sole; Dover sole; English sole; Flathead sole; Halibut; Petrale sole; Rex sole; Slender sole.
Rockfish:	*Sebastes alutus; S. crameri; S. elongatus; S. entomelas; S. paucispinis; S. proriger*
Roundfish:	Blackcod; Shiner perch; Pacific hake; Pacific tomcod; Walleye pollock; shad; wolf-eef.
Selachii:	Ratfish; skate